REMARKS

Applicant requests that the Examiner reconsider and allow the application in view of the foregoing amendment and the following remarks.

In response to the office action mailed January 4, 2001, Applicant acknowledges that claims 25-28 contain allowable subject matter. Non-elected claims 1-21 and 35-54 are canceled without prejudice for presentation in a divisional application. A new ABSTRACT is presented to overcome the objections to the original one. The specification is amended to further describe Figures 4 and 7. The axes in the figures show relative dimension of illumination mask. The center is located at coordinates (0,0). The edges of the mask are at (1,1), (1, -1), (-1, -1) and (-1, 1).

Claim 23 is amended to conform to the antecedent basis provided in claims 22 for a diffraction pattern of dithered pixels. The term "same" is deleted from claims 23. The term "relative" is deleted from claim 26.

Using dithering to control illumination of a photomask is novel. Dithering of pixels in the printing industry to render an image is conventional. The notation D8 is conventional matrix notation indicating a matrix of 8 x 8 elements. That is known to those skilled in the art. The expression U^m identifies the individual intensity of an element in the dithering matrix.

The invention is not shown or suggested by the art of record. The references of Ogawa (US 5,627,625) and Taniguchi et al. (5,677,757) fail to show or suggest the step of "diffracting the light through a masking aperture having a half tone diffraction pattern of dithered pixels patterned for distributing the light into two or more zones." Neither reference shows or suggests using a half tone diffraction pattern of dithered pixels. In contrast, Ogawa relies upon a wedge shaped prism unit 17 to diffract the illumination source into four beams and Taniguchi relies upon the pupil filters to control illumination of a photomask. Neither reference mentions a dithered pixel illumination aperture and neither reference shows any dithering.

Respectfully submitted,

7/2/01
Date

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PATENT
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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

Applicant:	Bruce W. Smith	)	Examiner: N. Nguyen
Application No. :	09/422,398	)	
Filing Date:	October 21, 1999	)	Art Unit: 2851
For:	ILLUMINATION DEVICE FOR PROJECTION SYSTEM AND METHOD FOR FABRICATING	)	

MARKED-UP ADDENDUM SHOWING AMENDMENTS TO CLAIMS AND SPECIFICATION

Box: Non-Fee Amendment
Assistant Commissioner for Patents
Washington, DC 20231

Dear Sir:

In compliance with Rule 1.121, Applicant hereby submits the following marked-up copy of the revisions made to the specification and the claims by the Amendment submitted in response to the Office Action mailed January 4, 2001.

IN THE SPECIFICATION

On page 7, rewrite the paragraph beginning on line 21 as follows:

Figure 4 is a plot of the x-y distribution of dithered bilevel masking cells for an illumination aperture consisting of four circular normal distributed-intensity zones placed at diagonal positions corresponding to off-axis illumination for geometry oriented in horizontal and vertical directions. The axes are divided into relative distances using the center and the edges of the mask.

On page 7, rewrite the paragraph beginning on line 33 as follows:

Figure 7 is a plot of the x-y distribution of dithered, bilevel masking cells for an illumination aperture consisting of four elliptical normal distributed-intensity zones

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placed at diagonal positions corresponding to off-axis illumination for geometry oriented in horizontal and vertical directions. The axes are divided into relative distances using the center and the edges of the mask.

IN THE CLAIMS

Cancel claims 1-21 and 35-54 without prejudice.

24. (amended) The method of claim 22 wherein said half-tone diffraction pattern of dithered pixels [image] comprises an array of pixels, each pixel of a clear or opaque type [and of the same size], said clear and opaque pixels for respectively passing and blocking incident light, wherein the number, size, and type of the pixels are chosen in accordance with:

(a) the wavelength of light used to illuminate the photomask, and

(b) the size and shape of the features of the photomask, for generating a continuous illumination intensity pattern on the photomask with illumination intensity at any location controlled by the half-tone dithered image.

26. (amended) The method of claim 24 wherein the [relative] intensity of each subpixel is defined by a recursion relationship where:

$$D^n = \begin{vmatrix} 4D^{n/2} + D_{00}^2 U^{n/2} & 4D^{n/2} + D_{01}^2 U^{n/2} \\ 4D^{n/2} + D_{10}^2 U^{n/2} & 4D^{n/2} + D_{11}^2 U^{n/2} \end{vmatrix}$$

where:

$$U^n = \begin{vmatrix} 1 & 1 & \dots & 1 \\ 1 & & & \\ \vdots & & & \\ 1 & & & \end{vmatrix}$$

Cancel claim 29.

30. (amended) The method of claim 22[29] wherein the zones are arranged symmetrically about the center of the masking aperture.

31. (amended) The method of claim 22[29] wherein the zones are arranged asymmetrically about the center of the masking aperture.

32. (amended) The method of claim 22[29] the zones have one shape selected from the group consisting of circles, squares, rectangles, ellipses, rings, circular rings, square rings and combinations thereof.

33. (amended) The method of claim 22[29]wherein the selected shape is a stepped square.

34. (amended) The method of claim 22[29] wherein the zone(s) is shaped in an ellipse and the major axis of each ellipse is aligned at a 45 degree angle with respect to the center of the masking aperture.

Respectfully submitted,

7/2/01
Date

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